Serial No.: 09/723,356

IN THE SPECIFICATION:

Please replace the paragraph beginning at page 5, line 13 with the following rewritten paragraph:

--According to one aspect, the present invention includes methods and systems for providing reactive compensation for magnetic current loops in a magnetic-current-loop-based communication system. For example, each current loop in a magnetic current loop system may be divided into a number of segments. A single current source may be used to drive all of the magnetic current loops in the system. Reactive compensation may be provided for each segment so that the reactive compensation cancels the series reactance of each segment. Because the reactive compensation effectively cancels the reactance of each segment of the current loop, the phase delay along each current loop is nearly zero. As a result, the magnitude and phase of the current along each current loop will be nearly uniform at any given time. In addition, since adjacent loops are preferably divided and reactively compensated in a similar manner, lower-order fields resulting from inexact compensation cancel. Since the dipole fields of such current loops cancel at distances far from the current loops, only quadrupole and higher order fields remain, which decrease rapidly as the distance from the source increases. As a result, near fields can be extended by increasing power without violating regulatory standards and without requiring unnecessarily complex drive electronics. The increased near fields result in a greater communication distance between readers and identification devices. According to another aspect, a magnetic current loop system includes a magnetic current loop being divided into n sections, n being an integer. Each of the n sections has a series reactance at a frequency. n

reactive compensation elements are respectively coupled to each of the n sections. Each of the n reactive compensation elements has a reactance that substantially cancels the series reactance of the corresponding section at the frequency. This produces substantial current magnitude and phase uniformity along the magnetic current loop. Each of the n sections includes a series resistance, a series inductance, a shunt capacitance, and a shunt resistance. The shunt capacitance and the shunt resistance each have a first time constant. Each of the reactive compensation elements has a reactance value such that the series reactance and an effective capacitive series reactance of each of the sections has a second time constant that is substantially equal to the first time constant.--

Please replace the paragraph beginning at page 13, line 10 with the following rewritten paragraph:

--Figure 8 is a schematic diagram of a magnetic current loop including reactive compensation according to an embodiment of the present invention in which the compensating reactance is chosen to be slightly off resonance for each section. ~~series reactance series reactance.~~ More particularly, each capacitor $C_{s(k)}$ where $1 \leq k \leq n$ is chosen to be slightly off resonance for its respective section ***(k)***, such that the series impedance of the compensated section is $Z_{s(k)} = R_{s(k)} - \frac{j}{\omega C_{e(k)}}$, where $C_{e(k)} = \frac{C_{s(k)}}{1 - \omega^2 L_{s(k)} C_{s(k)}}$ is the effective series capacitance of section *(k)*. The value of $C_{e(k)}$ must be chosen such that $Z_{s(k)}$ of section *(k)* is a positive real constant $A_{(k)}$ times the parallel impedance $Z_{p(k)} = X_{(k)} Z_p$ real number $X_{(k)}$ is the effective length of section *(k)*,

$Z_p = \dfrac{R_p}{1 + j\omega R_p C_p}$ is the shunt impedance of a unit length section, and R_p and C_p are parallel resistance and capacitance respectively per unit length of section. Notice that except for $X_{(k)}$, $Z_{p(k)}$ depends only on the dielectric environment of the section. Therefore, the $Z_{p(k)}$ of all sections of a loop are real valued multiples $X_{(k)}$ of the same complex constant if the loop is in a uniform dielectric environment, such as identical width runs on a printed circuit board. If input impedance $Z_{in(k+1)}$ of section *(k+1)* is $D_{(k+1)}$ Z_p, then input impedance $Z_{in(k)}$ of section *(k)* is

$$Z_{in(k)} = Z_{s(k)} + \frac{Z_{p(k)} Z_{in(k+1)}}{Z_{p(k)} + Z_{in(k+1)}} = \left(X_{(k)} A_{(k)} + \frac{X_{(k)} D_{(k+1)}}{X_{(k)} + D_{(k+1)}} \right) Z_p = D_{(k)} Z_p,$$

where $D_{(k)}$ is a real number. By recursion then, $Z_{in(k)} = D_{(k)} Z_p$ where $D_{(k)}$ is real for all *(k)*. The current transfer function for section *(k)* is:

$$F(k) = \frac{Z_p(k)}{Z_{in}(k+1) + Z_p(k)} = \frac{X(k)}{D(k+1) + X(k)}$$

which is real, and which means theoretically that the input and output currents are exactly in phase. Consequently, the phase uniformity of the entire loop may be made arbitrarily good with suitably large choice of ***n***.--